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Individual lending versus group lending: An evaluation with Kenya's microfinance data

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Abstract

Group micro-lending has been used successfully in some parts of the world to expand the reach of microcredit programs. However, our study shows that microfinance institutions in Kenya prefer individual lending which is associated with higher default rates compared to group lending. The study also shows that high interest rates increase the odds of client delinquency while loan size is inversely related to delinquency. Given these findings, policymakers need to work for stability in the macro-environment to ensure interest rates charged by microfinance institutions (MFIs) remain stable and affordable. Alternatively, MFIs can develop a graduated scale for charging interest rates in which credit is extended to groups at first to hedge the firm against repayment risk; following this, the firm identifies individuals within the groups whose credit risk has improved and issue progressive individual loans to them. Such individual loans would fetch higher returns in form of interest for MFI and boost their outreach, reduce delinquency, and enhance self-sufficiency.

JEL classification: G21; G23; O16

Keywords: Loan delinquency; Microfinance; Microcredit; Group loans; Individual loans

1. Introduction

The operations of microfinance institutions[1] in Kenya are governed by the Microfinance Act of 2006. According to the Act, microfinance institutions (MFIs hereinafter) are classified into and registered in three different tiers: deposit-taking institutions such as commercial banks, credit-only non-deposit taking institutions, and informal organizations. The latter category includes rotating savings societies, club pools and financial services associations. The 52 MFIs, registered in Kenya with the objective of facilitating access to financial services among the unbanked poor, currently serve about 6.5 million clients with an outstanding loan portfolio in excess of US$ 310 million.[2] Despite the enactment of the Microfinance Act in 2006 and the subsequent proliferation of MFIs, available statistics show that 35.2% of Kenyans are still unable to access formal financial services and another 30.2% are entirely excluded from accessing any form of financial service.[3]

Worldwide, the microfinance sub-sector has had to contend with numerous challenges. One of the major challenges faced, especially by personal loan programs of MFIs, is that borrowers are highly risky since they are typically low net-worth individuals with little or no collateral that can be acquired by the MFI in the event of default. A popular remedy to this problem

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[1] Johanna (1999) describes a microfinance institution as a financial institution whose major activities include provision of small loans typically for working capital, informal appraisal of borrowers and investors, provision of collateral substitutes (such as group loans), the provision of social intermediation via group formation, and training in financial literacy and management capabilities.

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[2] The 52 MFIs are those affiliated to the Association of Microfinance Institutions of Kenya (AMFI), an organization registered in 1999 under the Societies Act to build capacity of the microfinance industry in Kenya. The statistics were accessed February 11, 2013, from the AMFI website: http://www.amfikenya.com/pages.php?p=1.

[3] Information accessed December 9, 2012, from Central Bank of Kenya website: http://www.centralbank.go.ke/financialsystem/microfinance/Introduction.aspx.

involves requiring borrowers to apply for credit in voluntarily formed groups: since such borrowers know each other, safe borrowers will likely form their own groups, avoiding those with higher risk profiles – this mitigates the adverse selection problem (Armendariz and Morduch, 2007).

The group lending model, first used in Bangladesh, may not be exactly replicable in the Kenyan context: Bangladesh has an area of 147,600 km^2 with 130 million people while Kenya has an area of 580,400 km^2 with 43 million people. This implies that the information network in Kenya could be much weaker than that of Bangladesh where group lending model has operated efficiently; members of a group in Kenya may not be able to as fully monitor how funds borrowed from MFI are used by their peers as members of a Bangladeshi group. Nevertheless, the microfinance sector in Kenya has largely adopted the Bangladeshi model and runs two broad microcredit programs: personal lending and group lending.[4] Credit is typically granted to finance business/entrepreneurial activities under both programs but it is believed that significant unfulfilled market demand also exists for personal loans to finance consumption and emergency needs (see also Woller, 2002).[5] The two credit programs (personal and group lending) exhibit different characteristics defined by, among others, the rapidity of loan approval, repayment periods (defines as weeks or months), interest rates, and other program specific terms.

Dellien et al. (2005) discusses key differences between the group lending and individual lending programs. First, because time and effort is invested in building social networks that enable groups to select members who are creditworthy under group lending, the role of loan officers is to provide structure, training on loan processes and administrative support. Under individual lending, loan officers bear principle responsibility for loan decisions; they screen, and monitor their clients as well as come up with mechanisms of enforcing repayment. Second, the principle incentives for repayment of group loans is joint liability, group reputation, credit rating and future access to credit for each member, all of which are directly contingent on each member upholding their obligations. On the other hand, individual lending programs use a variety of incentives such as collateral requirements, co-signers and guarantors to promote repayment and repayment discipline is created by strict enforcement of contracts.

Each of the two lending programs has its strengths and weaknesses. Armendáriz and Morduch (2000) observe that group meetings facilitate education and training useful for clients with small experience and improve financial performance of their businesses. Other researchers (Godquin, 2004; Madajewicz, 2011) argue that group lending helps mitigate the risks associated with information asymmetry: for instance, because group borrowers are linked by joint liability, if one of them switches from safe to risky project (moral hazard), the probability that her partner will have to pay the liability rises. This gives group members the incentive to monitor each other. The reduction in group members' default through peer pressure and social ties has also been discussed (Guttman, 2007; Dixon et al., 2007; Al-Azzam et al., 2011). However, Maria (2009) points out that group monitoring may be rendered ineffective where social ties are loose, and the cost of monitoring each other high.

Group lending is not without setbacks. Savita (2007) argues that group lending is associated with additional costs including group formation costs, training borrowers on group procedures, higher degree of supervision and a higher frequency of installment payments. These costs increase interest rates of such microcredit loans leading to enhanced repayment risk. Other researchers argue that joint liability in group lending penalizes good credit risk customers (Giné and Karlan, 2010), could hinder optimal utilization of borrowed funds by clients (Madajewicz, 2003) and might even jeopardize repayment since the incentive of future credit is no longer present in the event that one member fails to pay (Besley and Coate, 1995).

Individual lending programs also present several benefits. For instance, Armendáriz and Morduch (2000) find that the guarantor exerts sufficient social pressure on the client to repay MFI loans in Russia and Eastern Europe. However, Laure and Baptiste (2007) argue that the guarantee mechanism, especially personal guarantees, is only meaningful if the borrower has assets that can be pledged as surety, if the institutional framework permits the actual transfer of ownership of the pledge from the borrower to the creditor easily and if the pledged assets are not very liquid. The duo contends that these three conditions are not met in many developing countries. In particular, Kenya has a rigid judicial system with a large number of pending cases which may hinder timely transfer of pledge and most MFI borrowers may not even have "that small collateral". Another benefit of individual lending is that it spares borrowers the negative effects such as time spent in group meetings and loss of privacy when they discuss their financial situation and investment projects with the peers who could oppose such projects (Maria, 2009) in the process impeding their individual growth (Giné and Karlan, 2010).

Given the strong arguments advanced in favor of both individual and group lending, MFIs find it confusing making a choice between the two lending programs. We believe that the choice should be informed, in principle, by each firm's philosophical orientation. The provision of microcredit services has been explained by three philosophical arguments (Armendáriz and Morduch, 2000). First is the institutional approach, which argues that institutional sustainability is paramount so that MFIs should be able to cover their operating and financing costs with program revenue. The opposing view is the welfare approach, which argues that MFIs can attain sustainability without achieving financial self-sufficiency.[6] Then there is the middle ground view,

[4] In Kenya, as in Bangladesh, personal lending involves extending credit to an individual borrower while group lending involves extending credit to two or more people who are held liable for each other's credit (Maria, 2009).

[5] In the context of microfinance credit, a business loan is a working capital loan designed to facilitate growth, expansion and upgrade of a business while a personal loan is an unsecured salary advance for customers to meet emergency needs (Faulu Kenya, 2012).

[6] The *institutionalists* argue that large scale outreach to the poor on a long-term basis cannot be guaranteed if MFIs are not financially sustainable while

known as the win-win approach, which argues for balancing the goals of poverty alleviation and financial self-sustainability. Our thesis is that microfinance institutions with high aversion to risk ascribe to the institutional approach and tend to prefer group lending while those with lower aversion to risk tend to identify with the welfarists' approach and prefer individual lending.

However, Hermes and Lensink (2009) have observed that a majority of MFIs are now focusing on financial sustainability and efficiency (the institutional approach) due to increasing competition. Given this observation, it is our view that the risk of delinquency should play a key role in informing the preference for either group lending or personal lending by MFIs. Empirical investigations have pointed out a number of factors that may affect the likelihood of delinquency on microcredit obligations. Mokhtar et al. (2009) find that training to an MFI borrower, the loan amount advanced and age are significant factors affecting loan default in Malaysia. Similarly, Laure and Baptiste (2007) find loan amount a significant variable affecting default in microcredit programs.[7] The interest rate has also been found to be an important factor affecting microcredit loan delinquency (Warui, 2012; Pereira and Mourao, 2012).[8]

A key feature of MFIs that is often linked to delinquency risk is the frequent collection of loan installments. According to Field and Pande (2008), frequent repayments provide clients with a commitment device that helps them form a habit of saving (this facilitates loan repayment), and improves their trust in loan officers and their willingness to stay on track with repayments. However, frequent repayments increase transaction costs and increase default risk when clients graduate to larger loans since this increases the amount of their cash outlays. Default risk has also been found to increase when loan officers fail to undertake their key roles – screening and encouraging clients, and training them on financial discipline – properly (Dixon et al., 2007). Another factor that influences delinquency risk is gender. Studies have shown that women often demonstrate stronger willingness to pay than men (Armendariz and Morduch, 2007; Phillips and Bhatia-Panthaki, 2007) largely because they have lower credit opportunities than men and hence must repay their loans to ensure continued access to credit and are easier to monitor since they tend to stay closer to their homes than men.

Our study sought to examine the two key microfinance programs with a view to evaluating their effectiveness in addressing the financial needs of the target beneficiaries (borrowers). We also sought to attribute loan delinquency under each program. The study proceeds on the premise that borrowers' likelihood of default diminishes if their financial needs are satisfactorily addressed. Consequently, we evaluate the effectiveness of a lending program through an analysis of its propensity to loan delinquencies. Thus, microfinance programs that exhibit high tendencies for loan delinquency are deemed not to effectively address borrowers' financial needs.

Warui (2012) documents an increasing trend in level of loan delinquency among MFIs in Kenya. This may be a pointer to increased ineffectiveness of the institutions' various lending programs. Although many studies (e.g., Guttman, 2007; Dixon et al., 2007; Aniket, 2011; Al-Azzam et al., 2011) have analyzed the pros and cons of group and individual lending, data sets are often insufficient to draw meaningful inferences about the most suitable microcredit program. As we have shown through a survey of the literature, researchers have advanced conflicting arguments about the two lending programs. Such conflicting arguments about the approach to use in delivering credit services have left a gap and uncertainty as to which is the appropriate credit program, particularly where default risk mitigation is concerned.

A recent study almost similar to ours is Pereira and Mourao (2012). However, their study focuses on how MFIs can overcome credit defaults. For the purposes of their analysis, the duo categorizes the world into regions, which include the Middle East and North Africa (MENA). In their conclusions, however, they warn about the danger of generalizing default risk of MFI credit since MFIs operate in places that are geographically isolated and hence their borrowers exhibit varying characteristics. In the Kenyan MFI context, there has never been a detailed comparative evaluation of the two microcredit programs. Therefore, participants in Kenya's microfinance industry have no scientific rationale for preferring one of the two lending programs over the other. And as our results show, sub-optimal decisions have been made by microfinance credit providers in as far as making the appropriate choice of a suitable lending program is concerned.

The key finding of this study is that group lending is better able to mitigate loan delinquency than personal lending. The study proffers several policy suggestions. Among others, we recommend that the threshold for individual lending must include demonstrable ability of a borrower to pay interest of at least 1.8% per month. Group loans should be issued where this condition is not met. Secondly, MFIs are advised to extend high loan amounts (amounts in excess of KES 100,000) largely to group borrowers, which the study finds to show tendency for low default risk.

The rest of this article is organized as follows. Section 2 discusses the data; Section 3 presents the theoretical model and describes the study's methodology; Section 4 presents and discusses our findings; conclusions and policy implications are in Section 5.

welfarists argue that the poor cannot afford higher interest rates, therefore, aiming at financial sustainability ultimately goes against the goal of serving large groups of poor borrowers.

[7] The two studies contradict each other on the role of loan amount on client default. Mokhtar et al. (2009) find lower the loan amounts to be associated with higher chance of default since low loan amounts are mostly extended to business beginners who lack experience on strategies of running a profitable venture. However, the findings of Laure and Baptiste (2007) associate higher loan amounts with higher likelihood of borrowers experiencing repayment problems because it becomes difficult for an individual MFI borrower to reimburse excessively high amounts if their ability to pay has not substantially changed since their first appraisal.

[8] The two studies provide evidence suggesting that low interest rates, by reducing borrower cash outflows, result in low default risk under both individual and group lending.

Table 1
Summary statistics of some microcredit lending terms.

	Mean	Standard deviation	Minimum	Maximum	Skewness
Interest rate (%, monthly)	1.75	0.01	0.025	2.89	−0.957
Age (years)	37.13	0.36	24	62	0.930
Loan amount (KES)	33,446.30	1487.56	5,000	250,000	3.301
Repayment (no. of weeks)	14.61	0.25	4	40	2.138

2. Data

A structured questionnaire was used to gather data from loan officers and credit controllers at the head offices of the microfinance institutions registered by the Association of Microfinance Institutions of Kenya (AMFI). AMFI has a registered membership of 52 firms of which 48 have their head offices in Kenya's capital, Nairobi. We surveyed all the 48 firms. However, only 35 firms returned filled questionnaires, of which three were incomplete or had missing information and were therefore discarded.

Over a period of three years, through November 30, 2012, and for each loanee, data was gathered in respect of age, loan amount granted, repayment intervals, interest rates charged, whether loan was granted to a loanee as part of a group or as an individual, whether the loanee was given financial training, and whether the account was delinquent. For the purposes of this analysis, a customer's account is deemed delinquent if it is classified as past due or has been declared to be in default by the concerned institution. Many MFIs in Kenya consider a loan past due if a period of four weeks or more has elapsed after the loan's due date. The loan is considered in default if it is eight or more weeks past its due date or if at least 48 weeks have elapsed after the first payment and the customer is yet to settle the entire obligation. The maximum amount of time given to loanees to pay up is typically 40 weeks and clients are generally expected to make the same payment at each interval. Thus, the two delinquency measures given above exclude customers who are taking long to repay not because they are defaulting, but because perhaps the interest rate is high and they need a longer period than the 40 weeks to fully settle their obligations to the MFI. We use the actual records kept by loan officers on defaulted and past due accounts. The survey was conducted in December 2012/January 2013.

Table 1 displays the summary statistics for some "lending terms variables" used in the empirical analysis. MFIs compute the interest payment to make it simple for the client to decipher. Thus, once the interest rate is agreed on between the client and the loan officer, the interest payment for the year (or loan period if shorter) is computed and loaded on to the principal. A repayment schedule is constructed by dividing the resulting figure over the number of repayment weeks. This number is then adjusted up or down to reach a round weekly payment. The table shows that the mean monthly nominal interest rate is 1.75%, or about 21% per year, with negative skewness. Since the standard deviation is a paltry 0.01% per month, the bulk of the loans given attract interest rates clustered around 1.75%; however, there are a few cases when interest rates exceed the mean value. The mean interest rate appears high but the (annualized) monthly inflation rate over the study period averaged 11.10%.[9] Thus, the real annualized interest rate on the microloans averaged only 9.90%, which appears appropriate for the high risk levels generally exhibited by microcredit applicants.

The mean age of a loanee is 37 years with a positive skewness, implying that MFIs generally tend to avoid loaning to very young clients. A more in-depth analysis of the data indicates that youthful applicants aged below 30 only represent 26% of the total number of loanees. This may be explained by the fact that the majority of the loans are given for business/entrepreneurial purposes and younger clients are most likely avoided due to their relative business inexperience. Notably by the time the borrowers have attained the age of 30–43 (64% of borrowers), they will have acquired adequate business knowledge hence should present lower default risk. The maximum amount of loan issued by a microcredit lender is KES 250,000 to be repaid within 40 weeks. However, on the average, customers are extended loans with a repayment period of only 15 weeks, with a standard deviation of 0.25 weeks. Clearly, lending terms appear pretty stringent in Kenya's microcredit market, making it very likely that clients generally strain to make good their obligations to the lending firms.

3. Empirical strategy

We use a structured questionnaire to gather data from loan officers and credit controllers of MFIs. The first part of the questionnaire uses a Likert-type scale in which each of the provided choice of answers is assigned an ordinal value, generating quantitative data that we interpret and present in frequency tables and charts. The first set of data therefore provides general information, particularly pertaining to factors considered by MFI loan officers when screening credit applicants. The second part of the questionnaire provides data that can explain loan delinquency among group and individual lenders. All the key potential factors from the literature are incorporated in the structured questionnaire and loan officers are requested merely to indicate the appropriate response in respect of each client.

The data are pooled and analyzed using logistic regression. Suppose that the dependent variable, y, can be explained

[9] The data is computed from the inflation figures obtained on February 15, 2013, from the Kenya National Bureau of Statistics website: http://www.knbs.or.ke/news/lei122012.pdf. The inflation rate for the year November 2010 through November 2011 was 19.72% and the inflation rate for the year November 2011 through November 2012 was 3.25%.

by a vector of r independent variables (or factors), $\boldsymbol{X}$. Thus,

$$y = f(X) \tag{1}$$

The logistic distribution function is expressed in the form (see, e.g., Gujarati, 2004):

$$P = E(y = 1|X) = \frac{1}{1 + e^{-\beta' X}} \tag{2}$$

where β is the vector of coefficients and P represents the odds of "success" for the dependent variable, y. Now suppose $z = \beta'\boldsymbol{X}$. The distribution function in Eq. (2) can now be expressed in a simpler form as follows:

$$P = \frac{1}{1 + e^{-z}} = \frac{e^z}{1 + e^z} \tag{3}$$

The parameter z has values ranging from $-\infty$ to ∞ while $\boldsymbol{P}$ ranges from -1 to $+1$. It is important to note that $\boldsymbol{P}$ is a nonlinear function of z and hence nonlinear in $\boldsymbol{X}$ and in β. Thus, the OLS regression procedure cannot be used to estimate the parameters, β. However, Eq. (3) can be linearized, first by expressing it as a function of $1 - P$, the probability of "failure":

$$1 - P = 1 - \frac{1}{1 + w^{-z}} = \frac{1}{1 + e^z} \tag{4}$$

Dividing Eq. (3) by Eq. (4) yields

$$\frac{P}{1 - P} = \frac{1 + e^z}{1 + e^{-z}} = e^z \tag{5}$$

The quantity $P/1 - P$ is the odds in favor of "success". Taking logarithms on both sides gives

$$L = \ln\left(\frac{P}{1 - P}\right) = z = \beta' X \tag{6}$$

L is known as the *logit*, hence the term logit (or logistic) regression. Parameter estimates are typically interpreted in their antilogarithm form (Eq. (5)), which gives the odds in favor of the dependent variable, y.

Finally, we gather data on the number of delinquent accounts as a proportion of the total number of loans given for each of the two loan programs – group loans and individual loans. We use this data to test the null hypothesis that the two proportions are equal. This is tested against the alternative that the proportion of delinquency is higher under individual lending programs.

4. Results

4.1. The preference for group or individual lending among MFIs

We first sought to establish the philosophical orientation of Kenya's microcredit firms. Consistent with the observations of Hermes and Lensink (2009), our data show that 69% of MFIs pursue institutional sustainability (or financial self-sufficiency) in their lending policy. Only 6% of the surveyed firms lend with the objective of poverty alleviation, or outreach to the poor, while the rest (25%) seek both financial stability and poverty alleviation (win–win approach). Next, we establish which services are offered by the MFIs in the country. Fig. 1 presents our findings. The figure shows that credit provision comprise of 55% of services offered by microfinance institutions while savings and deposits constitute 15% each. The remaining services provided by these institutions include insurance (6%) and "other" services (9%), which include money transfer and financial consultancy, among others. Now, credit services offered by MFIs can be in the form of individual or group loans.

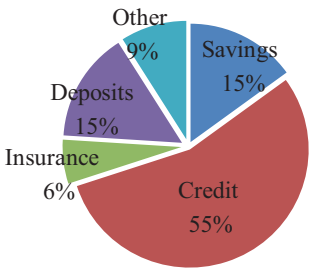

Fig. 1. Services offered by MFIs in Kenya.

Fig. 2 presents the factors motivating the preference for either of the two credit programs. The figure indicates that individual lending is preferred by microfinance institutions whose goals are to reach out to the poor, to minimize transaction costs and to maintain market share (by pursuing low client dropouts). Contrarily, MFIs prefer group lending if their goal is to expand in size or to lower delinquency and therefore increase their chance of financial sustainability and long-run survival. MFIs preferring group lending also point out the crucial roles of group meetings in screening repayment ability of the members, facilitating member training on business skills, and monitoring loan use. Despite the clear benefits associated with group meetings and lower delinquency levels in group loans, we find that 75% of microcredit issued in Kenya goes to individual borrowers while only 25% of credit is extended to group borrowers. So, why do Kenyan MFIs prefer individual lending? 86% of our respondents attribute this preference to poor information networks among group members that affect monitoring of loan usage.

Since it has relatively higher default risk in general, individual lending tends to derail the objective of financial sustainability and threatens firms' long-run survival. However, MFIs try to "hedge" their exposure to the higher default risk by imposing

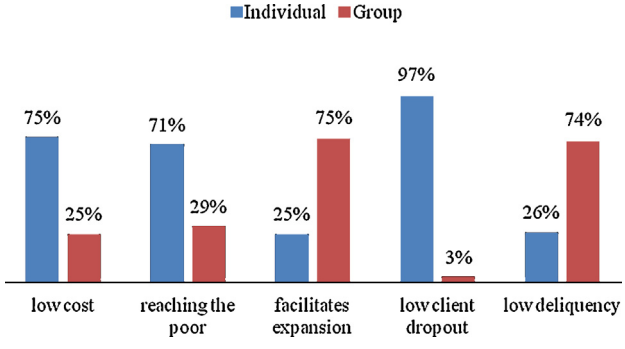

Fig. 2. Microcredit approaches and reasons for their adoption.

Table 2
Importance attached to factors considered in approving a loan application.

Factor	Important	Moderately important	Very important	Extremely important
Panel A: individual loans				
Weekly loan repayment ability	14%	36%	25%	25%
Interest rate above 1.8% pm	19%	19%	29%	33%
No collateral	3%	21%	21%	55%
Age of applicant	18%	32%	36%	14%
Business loan	8%	27%	23%	42%
Consumption loan	14%	38%	34%	14%
Loan amount > KShs.100,000	–	–	45%	55%
Panel B: group loans				
Weekly loan repayment ability	25%	19%	38%	18%
Interest rate above 1.8% pm	23%	23%	27%	27%
No collateral	15%	26%	33%	26%
Age of applicant	21%	29%	33%	17%
Business loan	29%	25%	25%	21%
Consumption loan	37%	33%	20%	10%
Loan amount > KShs.100,000	11%	21%	21%	46%

"security" requirements on individual loan applicants. Security refers to method of enforcing discipline in loan repayment. Our findings suggest that a large proportion (37%) of MFIs secure their individual loans through a third party guarantor, underlying the suggestion that guarantors have the potential to exert sufficient pressure on borrowers to pay because they are held personally liable in the event that the guaranteed loanee defaults (Armendáriz and Morduch, 2000). The remaining firms secure their individual loans either through the specific pledge of collateral (34%) or through cosigners (20%) or by legal action (9%).

4.2. *Factors affecting the preference for group and individual lending*

To mitigate adverse selection problems, microfinance institutions, like most conventional credit providers, take their loan applicants through an elaborate screening procedure before granting a loan. The key factors considered in the screening process are displayed in Table 2. As evident from the two panels in the table, the degree of importance attached to various factors in approving a loan, depends on the lending program. It is generally important for the MFI to check clients' repayment ability under both programs; this is because under either of the lending programs, borrowers are expected to repay the loans in frequent installments, typically weekly. This is because, as well as protecting micro-lenders from huge cash outflows, frequent repayments provide clients with a commitment device that helps them form a habit of saving, hence facilitating loan repayment (Field and Pande, 2008; Pereira and Mourao, 2012).

Closer check of the purpose of the loan (business use or consumption) by MFI loan officers is done under individual lending (panel A) while this factor appears to be of less importance for group borrowers (panel B); this implies that groups are assumed to be responsible for monitoring their members and it does not really matter what use each individual member of the group declares to the MFI. Where loan amounts greater than KES 100,000 are to be disbursed, microfinance lenders vet individual borrowers more heavily (55% extremely important, panel A) than group borrowers (46% extremely important, panel B). This is a pointer to the fact that individual borrowers are generally regarded to be of higher risk than group borrowers. In both cases, however, the finding that extreme importance is attached to this factor appears to suggest that MFIs would be hesitant to extend huge amounts of credit to their borrowers in general. The age of loan applicant is also generally regarded as a key variable in the screening exercise.

Because of their higher default probabilities, individual borrowers are generally charged a higher default premium. Thus, MFIs place extreme importance on individual borrowers' ability to pay interest rate above 1.8% per month and to provide collateral (panel A). The interest rates charged under the two programs are reported in Table 3. The table shows that group lending attracts interest rates in the range 1.2–1.8% per month while under individual lending, borrowers are mostly charged above 1.8% per month.

This finding is consistent with the earlier explanation that group lending would be preferred because of lower average delinquency levels and social collateral. From another perspective, the higher interest rates on individual lending translate into potentially higher average returns which may make individual lending more attractive to MFIs than group lending. This may explain the preference for individual lending among MFIs.

Table 3
Average interest rates under the two microcredit programs.

Interest rate	1.2–1.8% pm	Above 1.8% pm
Panel A: group lending		
Percentage of MFIs	80%	20%
Panel B: Individual lending		
Percentage of MFIs	39%	61%

Table 4
Logistic regression estimation results.

		Variables					LR/
	Constant	INT	AGE	LAMT	RPT	CAT	Wald
Eq. (1)	4.68**	1.44***	−0.02	−0.56***	−0.03	0.83***	33.19
	(2.49)	(2.80)	(−1.63)	(−3.30)	(−1.28)	(2.84)	[0.00]
Eq. (2)	–	1.87***	−0.02	−0.23**	−0.03	1.12***	70.37
		(3.40)	(−1.21)	(2.46)	(−1.19)	(4.09)	[0.00]

The sample consists of 420 clients about whom we obtained data from the surveyed MFIs. The LR/Wald is the chi-square statistic (with five degrees of freedom), respectively for the models with constant and with constant restricted to zero, for the hypothesis that all the five variables are zero. INT, AGE, LAMT, RPT and CAT respectively are interest rates, age of client in years, natural log of loan amount, repayment period in weeks and loan category (group or individual). The values in brackets are the z-statistics (calculated with robust standard errors) of the reported coefficients; p-values of the reported chi-square statistics are in square brackets.

4.3. Causes of delinquency in microfinance lending programs

The potential factors determining loan delinquency among microfinance loanees have been alluded to in our findings reported in Section 4.2 as well as in the literature (Adongo and Stock, 2005; Field and Pande, 2008; Field et al., 2010). These factors include interest rates, age, loan amount, repayment period and loan category (group or individual). We examine the relative importance of these five factors on the probability of default on microcredit. To achieve this, we run a logistic regression with these factors explaining loan delinquency (the dependent variable). We estimate the following model:

$$\mathrm{DEL}_i = \beta_0 + \beta_1 \mathrm{INT}_{ij} + \beta_2 \mathrm{AGE}_{ij} + \beta_3 \mathrm{AMT}_{ij} + \beta_4 \mathrm{RPT}_{ij} + \beta_5 \mathrm{CAT}_{ij} + \varepsilon_i$$

where for each client i and lender j, INT_{ij} is the interest rate charged; AGE_{ij} is the age of client; AMT_{ij} is the amount of credit advanced; RPT_{ij} is the number of weeks after which loan must have been fully cleared; and CAT_{ij}, the category of loan granted, takes the value "0" if the client was a member of a group and "1" if the loan was given to the client as an individual. Following Field and Pande (2008), the dependent variable (delinquency rate, DEL_i) is a dummy which takes on a value of "1" if a client's loan account was delinquent and "0" otherwise. Coefficients estimates are evaluated for significance against heteroskedasticity robust standard errors.

We estimate two equations, one with an intercept term, the other with the intercept restricted to zero. Our results, presented in Table 4, show that coefficient estimates are qualitatively similar for the two equations.[10] However, the test for the restriction that all coefficients are zero is better for the second equation, indicating that our regression model performs better with the constant restricted to zero. The results suggest that the interest rate is a significant (at the 1% level) variable influencing MFI loan delinquency. For an increment in the interest rate by, say 1% monthly, the odds in favor of a delinquency increase by 1.87%. That is, microcredit accounts are about 6.5 times (i.e., exp 1.87) more likely to experience delinquency if interest rates increased by 1 percentage point. This is consistent with the works of Appiah (2012) and Carty (2012) who find that loan defaults increase as interest rates increase because the borrower now has to earn more money to be both self-sustaining and pay back her loan. The ability to do both becomes increasingly difficult, and if the interest rate is high enough, it can become impossible to repay a loan. If more and more borrowers default on their loans due to high interest rates, again, microfinance institutions have less money to lend to those who need the loans and are exposed to the risk of failure.

Results also suggest that loan size is a significant factor (at the 5% level) influencing loan delinquency. In particular, an increment in log loan amount by 1 unit translates into a decline in odds in favor of delinquency by 0.23. Put differently, a unit increment in the log of the loan size results in a 26% (exp 0.23–1) decline in the chance that a microcredit client would fail to meet her obligations on the loan. This finding may suggest, consistent with Mokhtar et al. (2009), that the lower the loan amount, the higher the chance of default since low loan amounts are mostly extended first to business beginners who lack experience on strategies of running a profitable venture and secondly, to more risky borrowers. The inverse relationship between *DEL* and *LAMT* may also lend itself to the interpretation that group borrowers tend to be less delinquent than individual borrowers. This inference is premised on the argument that since large loan amounts are associated with group borrowers (who have lower default risk), larger loan amounts must be associated with fewer incidents of delinquency.

The latter inference is corroborated by the coefficient of *CAT* – the loan category. Results show that loan category, a binary variable with a value of "1" for individual loans and "0" for group loans is a significant (at 1%) variable affecting loan delinquency. Our findings indicate that individual loanees are three times (exp 1.12) more likely to default on their microcredit obligations than group borrowers. Given this finding, it is not clear why microcredit in Kenya institutions prefer to issue individual loans and the reason given by many MFIs than group monitoring effectiveness is compromised by weaker social cohesion in Kenya seems not to be convincing. Since most Kenyan MFIs pledge allegiance to the philosophy of self sustenance and institutional stability, it would be in their best interest to take advantage of superior repayment prospects offered by group borrowers. Further, the

[10] Our preliminary investigation with OLS regression indicates that the model performs better (in terms of R-squared) with the constant restricted to zero than with the constant included. Here, we examine both equations. Since the coefficient estimates are qualitatively similar, the discussion that follows focuses on results of the second equation.

social collateral offered by groups would reduce the need for and the expenses associated with loan guarantors, commonly used in Kenya to provide security in microcredit contracts. The formal relationship between individual/group borrowing and loan delinquency is investigated and discussed in Section 4.4.

Although not statistically significant, loan delinquency is inversely related to AGE. Similar results have been documented by Mokhtar et al. (2009) and Bhatt and Tang (2002) both of whom suggest that older borrowers would be more responsible and disciplined in repaying their loans than younger borrowers. The lack of experience in the business involved, which results in less income received, might be the reason that the younger crop of borrowers has difficulty repaying their loans.

Finally, the repayment period (RPT) is not a significant variable influencing delinquency; this fact is explained by the observation that irrespective of whether the lending is to groups or to individuals, and irrespective of the loan size, microcredit borrowers are required to make weekly installments over a maximum of forty weeks. There is an inverse relationship between delinquency and repayment. Field and Pande (2008) explain this relationship thus: if individuals are rational and function in a full information environment, then a less rigid repayment schedule should never increase default or client delinquency. Rather, by encouraging longer term investments it may improve clients' long run repayment capacity. In addition, clients incentives to repay according to the assigned schedule is driven entirely by fear of losing access to future loans from their provider while at the same time, less frequent repayment allows clients to accumulate enough funds from their business to guarantee prompt repayment and business survival. Contrarily, Mokhtar et al. (2009) find that a weekly loan repayment schedule posed problems for borrowers who generated a lower revenue cycle and suggested that MFIs should consider lowering the weekly repayment amount and providing longer duration of payments in response to borrowers who generate lower revenue and have a problem meeting their weekly repayment obligations.

The diagnostic statistics show that the model is well fitted. In particular, the *p*-value of the Wald-statistic indicates that the hypothesis that the five factors jointly have zero explanatory power on the probability of delinquency is rejected at the 1% level of significance.

4.4. Individual versus group lending and loan delinquency

This analysis seeks to answer the research question: which one of individual and group lending programs presents lower risk of default? Thus, the analysis seeks to establish whether observed differences in default proportions under the two lending arrangements are statistically significant. Therefore, we test the null hypothesis that the delinquency proportions under the two lending arrangements are equal. This is tested against the alternative that the proportion of loan delinquency is higher under the individual lending program.

To make inferences, we compare the calculated value of the *t*-statistic with the critical or tabulated value of the *t*-statistic. If the calculated value of the *t*-statistic is greater than the critical value, we reject the null hypothesis and conclude that the alternative hypothesis is probably true. Results of the analysis are presented in Table 5.

Table 5
t-Test: two-sample assuming unequal variances.

	Defaulted proportion (individual lending)	Defaulted proportion (group lending)
Mean	0.425	0.170
Variance	0.148	0.024
Hypothesized mean difference		0
Calculated *t*-statistic		6.40
$P(T \leq t)$, one-tail		<0.0001
Critical *t*-statistic, one-tail		1.65

From the statistics in Table 5, it is evident that the mean proportion of delinquency under individual lending (0.425) is higher than the mean proportion of delinquency under group lending (0.17). The lower part of the table tests the hypothesis that these two values are statistically equal. The computed value of the *t*-statistic (6.40) is greater than the critical value of the *t*-statistic (1.65). Therefore, the null hypothesis that the difference between the two proportions is equal must be rejected. A similar conclusion can be drawn by looking at the *p*-value of the *t*-statistic, which indicates that the mean default proportion for individual lending is statistically higher than that of group lending at the 1% level. From these results, this study concludes that group lending program is more effective than individual lending program in mitigating the risk of default among MFI clients. It therefore appears irrational for microfinance firms to prefer individual lending to group lending.

5. Conclusions

In countries such as Kenya where poverty levels are high and financial services do not reach the vast majority, microcredit is important in encouraging entrepreneurial activity and alleviating poverty. However, microcredit can only be effective if it is judiciously used to ensure that both the lender and the borrower reap the maximum possible gain. Group lending has been used successfully in some parts of the world (notably by the Grameen Bank) to expand the reach of microcredit programs. However, our study shows that microfinance institutions in Kenya prefer individual lending which is more "wasteful" in the sense that it cannot effectively address borrowers' financial needs. This is reflected in the higher default levels associated with individual lending compared to group lending. Loan delinquency is a suitable surrogate for loan effectiveness in addressing the borrower's financial needs because the higher the probability of default, the lower is the chance that the loan improved the borrower's welfare.

Other key causes of delinquency are the rate of interest and the loan size. Our study shows that high interest rates significantly increase the odds of client delinquency while loan size is inversely related to delinquency. The latter finding is attributed to the fact that lower amounts are typically extended to individual and younger borrowers while larger loans are generally issued

to group borrowers. Clearly, group lending appears to command an edge over individual lending in mitigating loan default.

Our findings suggest important implications for policy. Economic policymakers need to work for stability in the macro-environment to ensure interest rates charged by microfinance institutions remain not just stable but also affordable. This research has identified high interest rates as a key cause of loan default. As a policy suggestion, the interest rate problem could be solved via developing a graduated scale for charging interest rates; for instance, under group lending, once a group of safe borrowers is able to consistently repay their loan for say 12 months, the group size could be increased by allowing them to include other safe borrowers. This will in turn reduce the overall group and transaction costs, the older members of the group could then be charged lower interest rates relative to the new members; this would have a double positive effect since it would encourage the new group members to repay their loans so as to benefit from lower interest rates in future and the overall repayment rate would improve.

The results of this research imply that the two microcredit programs can be reconciled. Individual lending programs are characterized by relatively higher interest rates, collateral requirements, more autonomy on use of loans and higher default rates amongst others. Microfinance institutions can design their loan programs such that, at first credit is extended to groups; in that way they will be hedged against repayment risk. Group models help individuals to be more financially stable. Following this, MFIs can identify individuals within the groups whose credit risk has improved and issue progressive loans as suggested by Armendáriz and Morduch (2000). Individual lending will in turn fetch higher returns in form of interest for MFI; in this way MFI's outreach, low delinquency, low cost and self-sufficiency will be more easily achieved.

MFIs should induce self-selection of borrowers by offering contracts with different terms. For instance, a contract with low interest rates accompanied by high degree of joint liability would attract safe borrowers while a contract with high interest rates and low level of joint liability could be offered to more risky group borrowers and individual borrowers. In this way, the level of default on loans will reduce. In addition, MFIs need to appraise borrowers thoroughly to determine the loans appropriate for them. Where borrowers are not highly risky, increasing the group size might substantially reduce the costs associated with group lending.

An important caveat is that client behavior may be sensitive to the number of alternative credit sources available to them (Field and Pande, 2008). The importance of this issue increases as the number of MFIs and level of competition among them rise. If the primary penalty for default or delinquency is denial of future loans, clients will presumably be more willing to risk bad behavior as their alternative options expand. In such cases, factors such as repayment schedule may have a marginal impact on delinquency and default. However, the recent licensing of credit reference bureaus in Kenya may serve to check the proliferation of such unethical conduct. Needless to say, further research is required in Kenya to address this concern.

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